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Bariatric surgery and pregnancy protocol

	Counseling

Preconception visit	*General consideration*
	• 80% of patients undergoing bariatric surgery are women of reproductive age
	• NIH bariatric surgery indications
	  ○ ≥ 100 lb excess weight
	  ○ BMI ≥ 40 kg/m^2 without obesity-associated co-morbidities (DM, CV disease, sleep apnea)
	  ○ BMI 35-39.9 kg/m^2 with 1 of more associated medical problems
	  ○ Previous weight loss attempts
	
	Three primary bariatric approaches
	1. Gastric lap band (restrictive)
	  ○ Less effective long term
	  ○ 50% complication rate
	2. Vertical sleeve gastrectomy (restrictive)
	3. Roux-en Y (restrictive and malabsorptive)
	
	Future Pregnancy
	• Recommend reviewing risks and benefit of pregnancy outcomes after bariatric surgery (see table)
	• No difference in pregnancy outcomes between malabsorptive and restrictive procedures. (1)
	• Recommend delaying pregnancy 18-24 months post-surgery.
	
	Contraceptive counseling
	• Adolescents fastest growing group undergoing bariatric surgery and twice as likely to become pregnant compared general adolescent population. Recommend contraceptive counseling prior to bariatric surgery.
	• Oral contraceptive pills (OCPs) absorption decreased in Roux en Y. Consider non-oral contraceptives.

Pregnancy outcomes after bariatric surgery		
	Absolute risk	Relative risk
BENEFITS		
Macrosomia (>4000 g) (4)	1.1 vs 0.6%	OR .4 (0.2-0.8)
HTN disorder (4)	7.8 vs 2.2%	0.4 (0.3-0.6)
DM (total) (4)	5.7 vs 2.2%	0.6 (0.4-0.9)
Gestational DM (6)		0.4 (0.3-0.8)
Perineal laceration (5)	23.0 vs 12.5%	0.4 (0.3-0.8)
RISKS		
Cesarean section (6)		1.34 (1.1-1.7)
Small for gestational age (6)		2.7 (2.0-2.7)
Preterm birth (6)		1.4 (1.01 – 2.03)
PPROM (1)		1.9 (1.3-2)
NO CHANGE		
Miscarriage (7)	21.6 vs 26.0%	
Congenital anomaly (8)	4.1 vs 3.4%	

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	Management	Labs

Initial prenatal visit	• Recommend maternal fetal medicine consultation; consider transfer of care
	• Consider PPI given increased risk of ulcers and reflux
	• Consider 81 mg ASA for preeclampsia prevention
	• Nutritional considerations
	  ○ Review Institute of Medicine weight gain goals based on pre-gravid BMI.
	  ○ Recommend nutrition consultation
	  ○ Recommend protein 60-80 g/day
	  ○ Recommend prenatal PNV (with 400 mcg folic acid) **and** MVI containing vitamin B1 1.2 mg, vitamin K 90 mcg, biotin 30 mcg, zinc 8 mg, folate 400 mcg, iron 18 mg
	  ○ Ensure vitamin A supplementation ≤ 5000 international units (IU)/day
	  ▪ Vitamins with beta-carotene, the pre-form Vitamin A which is not teratogenic, are preferred. Retinyl acetate & retinyl palmitate in doses of > 5000 IU/day may be teratogenic.
	  ▪ See Appendix for common bariatric vitamin supplements.
	After malabsorptive surgery (Roux en Y)
	  ○ Vitamin B12 500-1000 mcg oral or sublingual daily
	  ○ Calcium citrate 1200-2000 mg with Vitamin D 400-800 IU daily
	
	After restrictive surgery (Lap band)
	  ▪ No consensus regarding nutritional supplementation
	  ▪ Consider early consultation with bariatric surgeon to adjust band for nausea/vomiting in first trimester
		CBC
		Ferritin
		Iron
		Vitamin B12
		RBC folate (not serum folate which reflects recent oral intake)
		Vitamin D
		Calcium
		
		Oral intake absorption of medications may be decreased. If therapeutic drug level critical, test drug levels

Second trimester	• 50% cannot tolerate glucola due to dumping syndrome (abdominal cramping, bloating, nausea, vomiting from fluid shifts post hyperosmolar fluid intake causing small bowel distension). <u>DM screening</u> ○ If able to drink a 12 oz soda, likely able to tolerate one hour 50 g glucose tolerance test <u>Alternatives</u> 1. Fasting and post-breakfast glucose checks x 1 week between 24-28 weeks 2. HgA1C > 6.5% 3. IV glucose tolerance test (9) (see below for protocol)	CBC Iron Ferritin Calcium Vitamin D Drug levels as needed

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Third trimester	• Most women remain obese after surgery and may require labor induction, more oxytocin and have longer labor than non-obese women. (1) • Bariatric surgery is not an indication for Cesarean delivery • Consider anesthesia consultation if BMI ≥ 45 and/or history of difficulty with anesthesia. • Consider prelabor consultation with bariatric surgeon if extensive abdominal surgery	Drug levels as needed
Post-partum	• Use caution with NSAIDs to avoid gastric ulceration. • Contraceptive counseling particularly if desiring OCPs and s/p Roux-en-Y as absorption may be compromised • Recommend lactation consult if breastfeeding • If breastfeeding, encourage calcium citrate supplementation 1500 mg, vitamin D 400-800 IU & vitamin B12 500-1500 mcg daily	Routine
Special Considerations	• Avoid extended release medication preparations; oral solutions and rapid releasing preparations are preferred. • Recommend high suspicion for gastro-intestinal complications in pregnant women with significant abdominal symptoms. Consider surgery consultation if presents with abdominal pain, nausea, vomiting or other abdominal symptoms.	

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Appendix

A. Common bariatric vitamin supplement contents

Brand	Vitamin A	Folic Acid	More information
Bariatric Advantage Advanced Multi EA ®	5000 IU (75% beta carotene; 25% Palmitate	400 mcg	https://www1.bariatricadvantage.com/catalog/us-en/1/Multivitamins
Celebrate ®	10,000 IU blended beta carotene and retinyl palmitate	800 mcg	https://www.celebratevitamins.com/education/compare/197.html
Fusion ®	1875 IU (does not specify type of Vitamin A)	200 mcg	http://bariatricfusion.com/vitamin-mineral-supplement-mixed-berry-flavor.html

B. IV glucose tolerance test protocol (9)

NPO eight hours prior to test

- Obtain fasting blood glucose
- IV 0.9 NS
- Push glucose 25 grams over 2-4 minutes
- Flush IV line then DC IV
- Blood sample 10 min after glucose load
- Blood sample 60 min after glucose load
- Q = 10 minute glucose/60 minute glucose
- K_t, glucose disappearance rate, is then read from the accompanying table
  - Normal values (note that **higher** value is normal)
    i. 1st trimester K_t **>** 1.37
    ii. 2nd trimester K_t **>** 1.18
    iii. 3rd trimester K_t **>** 1.13

Quotients: Q = 10 minute glucose / 60 minute glucose

Q	k	Q	k	Q	k
1.284	0.50	1.568	0.90	1.916	1.30
1.290	0.51	1.576	0.91	1.925	1.31
1.297	0.52	1.584	0.92	1.935	1.32
1.303	0.53	1.592	0.93	1.944	1.33
1.310	0.54	1.600	0.94	1.954	1.34
1.316	0.55	1.608	0.95	1.964	1.35
1.323	0.56	1.616	0.96	1.974	1.36
1.330	0.57	1.624	0.97	1.984	1.37
1.336	0.58	1.632	0.98	1.994	1.38
1.343	0.59	1.640	0.99	2.004	1.39
1.350	0.60	1.649	1.00	2.014	1.40
1.357	0.61	1.657	1.01	2.024	1.41
1.364	0.62	1.665	1.02	2.034	1.42
1.370	0.63	1.674	1.03	2.044	1.43
1.377	0.64	1.682	1.04	2.054	1.44
1.384	0.65	1.690	1.05	2.065	1.45
1.391	0.66	1.699	1.06	2.075	1.46
1.398	0.67	1.707	1.07	2.086	1.47
1.405	0.68	1.716	1.08	2.096	1.48
1.412	0.69	1.725	1.09	2.110	1.49
1.419	0.70	1.733	1.10	2.117	1.50
1.426	0.71	1.742	1.11	2.128	1.51
1.433	0.72	1.751	1.12	2.138	1.52
1.441	0.73	1.759	1.13	2.149	1.53
1.448	0.74	1.768	1.14	2.160	1.54
1.455	0.75	1.777	1.15	2.171	1.55
1.462	0.76	1.786	1.16	2.182	1.56
1.470	0.77	1.795	1.17	2.193	1.57
1.477	0.78	1.804	1.18	2.204	1.58
1.484	0.79	1.813	1.19	2.214	1.59
1.492	0.80	1.822	1.20	2.226	1.60
1.499	0.81	1.831	1.21	2.237	1.61
1.507	0.82	1.844	1.22	2.247	1.62
1.514	0.83	1.850	1.23	2.259	1.63
1.522	0.84	1.859	1.24	2.271	1.64
1.530	0.85	1.863	1.25	2.282	1.65
1.537	0.86	1.878	1.26	2.294	1.66
1.545	0.87	1.887	1.27	2.307	1.67
1.553	0.88	1.896	1.28	2.316	1.68
1.561	0.89	1.906	1.29	2.329	1.69

(Posner NA, Silverstone FA, Brewer J, Heller M: Simplifying the intravenous glucose tolerance test. J Reprod Med 27:633, 1982)

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Revised Date: MS/7-13-2015

These algorithms are designed to assist the primary care provider in the clinical management of a variety of problems that occur during pregnancy. They should not be interpreted as a standard of care, but instead represent guidelines for management. Variation in practices should take into account such factors as characteristics of the individual patient, health resources, and regional experience with diagnostic and therapeutic modalities.

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